

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

First named inventor: Klaus Fröhlich
Serial No: 10/709,513
Filing Date: 5/11/2004
Title: Device for Connecting Ends of Bars
Examiner: Joshua T. Kennedy
Art Unit: 3679

REPLY BRIEF

Appellant herewith submits a Reply Brief pursuant to 37 CFR 41.41 in response to Examiner's Answer dated 12/13/2006.

Examiner's Answer - page 4, line 13, to page 5, line 8, and page 8, line 3, to page 9, line 7.

Examiner's Opinion

In regard to *Michelson*, the examiner refers to col. 26, lines 66-67; col. 27, lines 1-10 and Figs. 96A to 96C and recites a sentence of col. 27, lines 6-10, as follows (leaving out the most important statement):

"Such a crossed configuration ... provides an extremely stable engagement ... as they are very close together and diagonally crossed "

What the examiner has eliminated from this sentence is the last part; the complete sentence reads as follows (emphasis added):

"Such a crossed configuration of bone screws 30 provides an extremely stable engagement of plate 960 to the bone as they are very close together and diagonally crossed within the same bone thus trapping an area of bone between them."

The examiner argues that the reference *Michelson* demonstrates that doubling the screws in arranging them in a staggered row is an obvious measure to a person skilled in the art for a secure engagement of a cylindrical object per se and that duplicating the parts

is merely an engineering principle of providing multiple fasteners in a staggered second row in order to increase the strength by even distribution of the stress applied to the bar. Transferring this measure to arrangements according to the prior art reference *Holdsworth* is obvious in examiner's opinion.

On page 8, lines 9 and 10, the examiner again recites a text portion of *Michelson* that is taken out of context; examiner refers to "an extremely stable engagement" as cited in col. 27, line 7, omitting that this extremely stable engagement is created by the screws **"... being diagonally crossed within the same bone thus trapping an area of bone between them."**

The examiner further states (page 8, lines 15-17) that *Holdsworth* already possesses the clamping arrangement and that *Michelson* is merely relied upon for the teaching pertaining to the staggered arrangement of the screws.

Appellant's Rebuttal

The examiner's argument is flawed from the outset. The starting point of the present invention can be only the arrangement according to *Holdsworth* because this reference concerns the technical field to which the present invention relates. In this prior art reference a single row of screws is shown in which all screws are aligned with one another and an increase of the number of screws is not possible. As is apparent from this reference, the inner pipewall has two abutments for the bar to be inserted and clamped therein. It is precisely this shape of the inner pipewall that requires the screws to be positioned opposite the abutments and perpendicular relative to the bar and to a line connecting the abutments because only when arranging the screws in such a way there is the maximum clamping and wedging action being applied to the bar between the projections of the inner pipewall. Arranging the screws at a slant and not perpendicular to the line connecting the abutments is not advisable at all in the configuration according to *Holdsworth*; a person skilled in the art would not take into consideration to arrange the screws at a slant since such an arrangement would not optimally wedge and clamp the bar inside the pipe.

In contrast to this prior art arrangement, the present invention proposes to apply the clamping force by arranging two rows of screws acting on the bar in combination with one contact surface within the pipe end so that radial forces are acting on the bar at three locations. This action principle is not identical to that of *Holdsworth* because the two rows

of screws allow for compensation of shape deviations of the bar.

Examiner takes information provided by the reference *Michelson* out of context and proposes no practicable and logic way of applying this concept to the design of *Holdsworth*. According to *Michelson*, by means of the staggered rows of screws the bone is pulled flat against the plate. The force for connecting bone and plate is exclusively transmitted by the screws and no pressure is applied or generated at a radially opposite location relative to the screws. The arrangement of *Michelson* differs in regard to the fastening principle (pulling two objects tightly against one another and “clawing” or “gripping” the material by the crossed screws) from that of *Holdsworth*, and the fastening method according to *Michelson* in no way can be applied to *Holdsworth*. In *Holdsworth*, the material of the bar is not to be pulled against the pipe wall; a second row of screws makes no sense in the three-point clamping arrangement of *Holdsworth* because the force introduction would no longer be optimal. The examiner states that *Michelson* is simply relied upon to show staggering of the screws; but it is precisely the staggering feature that is not desirable in *Holdsworth*: when the screws are not aligned and not perpendicular to the line connecting the abutments, the screws cannot apply their clamping force optimally and the strength of the connection is not increased but weakened because there is no longer the optimal force introduction into the abutments.

In the present invention, the clamping force applied onto the bar is distributed onto three locations that are distributed about the circumference of the bar; this provides improved force introduction onto the surface of the bar. It is an important feature of the present invention that a bar is safely secured in a pipe end by a uniform distribution of the forces in the circumferential direction and in the longitudinal direction of the bar while at the same time a shorter piece of pipe can be used. The combination according to the invention, i.e., a short pipe section and tightly spaced clamping elements applying uniformly forces in the circumferential direction and in the longitudinal direction of a bar, is not obvious in view of the cited prior art references. There is no suggestion to apply the principle of two staggered rows of screws, positioned at an angle to one another for pulling material against a plate, to the arrangement of a single row of screws acting onto a bar to push the bar against two abutments arranged opposite the screws so as to provide a three-point clamping action because two staggered rows no longer provide an optimal force

introduction into the arrangement of *Holdsworth*.

The conventional connection of bar ends in a pipe section is such that clamping means (screws) arranged in a single row force the bar against the diametrically opposed pipewall. *Holdsworth* has improved on this configuration by providing two abutments instead of one opposite the force introduction provided by the clamping screws. However, this wedging action between the abutments that extend continuously in the longitudinal direction on the inner pipewall makes the continuous clamping of bent or deformed bars difficult. The present invention has found a solution in regard to properly clamping bars with shape deviations of bent or deformed bars in that screws are arranged in two rows and cooperate with a single abutment: each screw can compensate shape deviations of the bar by being screwed until contact is made with the contour of the bar. Such a concept is not disclosed by or taught by the two rows of screws of *Michelson*.

CONCLUSION

For the reasons presented in the Appeal Brief and the reasons presented above, appellant believes that appealed claims are allowable over the cited prior art references, and respectfully requests that the Board of Patent Appeals and Interferences reconsider the rejection of the appealed claims and reverse the decision of the examiner in whole.

Authorization is herewith given to charge any fees or any shortages in any fees required during prosecution of this application and not paid by other means to Patent and Trademark Office deposit account 50-1199.

Respectfully submitted on February 13, 2007,

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